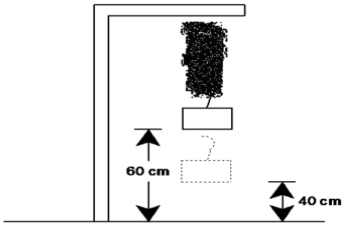
Name: _____ Date: _____ Period: _____

Pre-AP Precalculus Trigonometric Applications and Models:
Harmonic Motion

1. Bouncing Spring: A weight attached to the end of a long spring is bouncing up and down. As it bounces, its distance from the floor varies sinusoidally with time. You start a stopwatch. When the stopwatch reads 0.3 seconds, the weight first reaches a high point 60 cm above the floor. The low point is 40 cm above the floor; the weight reaches the low point at 1.8 seconds.

a) Sketch the graph of distances from the floor from 0 to 3.3 seconds.



b) Find the following values for this situation:

amplitude a = _____ phase shift c = _____

period constant b = _____ vertical shift d = _____

c) Write an equation expressing the distance from the floor in terms of time.

d) What was the distance from the floor when you started the stopwatch?

2. Tides of Port Aransas: While on the beach at Port Aransas, TX at 2:00 p.m. the tide was in (that means the water is at its deepest). At that time the depth of water at the end of a pier was at 1.5 meters. At 8:00 p.m. the same day when the tide was out, the depth of the water was at 1.1 meters. Assume the depths of water vary sinusoidally with time.
(HINT: Use a 24 hour clock where t = 1 is 1:00 a.m., t = 2 is 2:00 a.m., t = 3 is 3:00 a.m., …, t = 12 is noon, t = 13 is 1:00 p.m., etc.)

a) Sketch the graph of the depth of water in terms of time (hrs) that elapsed since 12:00 midnight.

b) Find the following values for this situation:

amplitude a = _____ phase shift c = _____

period constant b = _____ vertical shift d = _____

c) Write an equation expressing the depth of water in terms of time (hrs) that elapsed since 12:00 midnight.

d) Predict the depth of water at 4:00 p.m. and 7:00 p.m. the **next** day.